

**Web based portal for DESC  
simulation studies  
a.k.a. “ImSim on Demand”  
(a pre-implementation discussion)**

Tony Johnson, SLAC

[tonyj@slac.stanford.edu](mailto:tonyj@slac.stanford.edu)

5<sup>th</sup> December 2013

# Contents

- **Background**
  - Fermi Gamma-Ray Space Telescope web tools
    - Skimmers
    - Pipeline
    - Data Catalog
  - Web based MC framework for EXO
- **Potential simulation portal for DESC**
  - Goals, potential implementation
  - Open questions

# Fermi Gamma-Ray Space Telescope web tools

- Fermi developed an extensive web toolkit for data processing/quality monitoring/access
  - The toolkit is not Fermi specific and has been re-used by other experiments
- **Skimmers allow web based data selection**
  - Data selection is done in background by automated data processing system
    - Supports *parallelization* for efficient operation
    - User is notified by e-mail once data is ready
    - Data made available via web based data catalog

# Fermi Data Skimmers

Parameter	Value
Job Name	<input type="text" value="Mk421-%t-%n"/> Arbitrary name: %u=user name, %t=job type, %n=unique id
Event Sample	<input type="text" value="P7.6_P130_BASE"/> <a href="#">Event selection help</a>
Energy Range	Min: <input type="text"/> Max: <input type="text"/> MeV (Leave blank for no limit)
Time Range	Min: <input type="text"/> Max: <input type="text"/> Mission elapsed time (MET) (Leave blank for no limit)
Zenith-Angle Range	Min: <input type="text"/> Max: <input type="text"/> Angle (degrees) (Leave blank for no limit)
Position	RA: <input type="text"/> DEC: <input type="text"/> degrees (Leave blank for full sky) or astronomical object: <input type="text"/> using <input type="text" value="NED"/> overrides ra, dec above <a href="#">help</a>
Radius	<input type="text"/> degrees
Event Class	<input type="text" value="Source"/>
Output (FT2 Files)	<input checked="" type="checkbox"/> 30 second (fits) <input type="checkbox"/> 1 second (fits)
Output (Event Data)	<input checked="" type="checkbox"/> FT1 (fits) <input type="checkbox"/> LS1 (fits) <input type="checkbox"/> Merit (root) <input type="checkbox"/> Event-List (text)
FITS-file size limit	<input type="text" value="Unlimited"/> <input type="text"/> Megabytes <input type="text"/>
Debug Mode	<input type="text" value="False"/>
User Comment	<input type="text"/>
Expert Options	<input type="text"/> <a href="#">help</a>
<input type="button" value="Proceed"/>	

Parameter	Value
Job Name	<input type="text" value="%u-%t-%n"/> Arbitrary name: %u=user name, %t=job type, %n=unique id
Data Source	<input type="text" value="/Data/Flight/Reprocess/P202/MERIT@"/>
TCut	<input type="text" value="CTBParticleType == 0 &amp;&amp; CTBClass.Level &gt; 1 &amp;&amp; CTBBestEnergy &gt; 20000 &amp;&amp; abs(FT1B) &lt; 2.5 &amp;&amp; FT1ZenithTheta &lt; 100"/> <a href="#">help</a>
Min Run Number	<input type="text"/>
Max Run Number	<input type="text"/>
Datacat Criteria	<input type="text"/> <a href="#">help</a>
Tuple Columns	<input checked="" type="checkbox"/> Include all columns <input checked="" type="checkbox"/> Include Tkr* <input checked="" type="checkbox"/> Include Vbx* <input checked="" type="checkbox"/> Include Cal* <input checked="" type="checkbox"/> Include Acd* <input type="checkbox"/> Include Mc* <input checked="" type="checkbox"/> Include CTB* <input checked="" type="checkbox"/> Include FT1* <input checked="" type="checkbox"/> Include Evt* <input checked="" type="checkbox"/> Include Pt* <input type="checkbox"/> Include GIt* <input type="checkbox"/> Include Obf* <input type="checkbox"/> Include Grb* <input type="checkbox"/> Include Fsw*
Debug Mode	<input type="text" value="False"/>
Max Root file size (MB)	<input type="text" value="200"/>
User Comment	<input type="text"/>
Expert Options	<input type="text"/> <a href="#">help</a>
<input type="button" value="Proceed"/>	

# Web based MC framework for EXO

- Example of reuse of Fermi web toolkit
- Allows MC tasks to be configured via web
  - Supports hierarchy of tasks to make it easy to have many jobs which are similar but slightly different
  - Allows trial runs (limited number of events) for testing
  - Allows full task to be run for arbitrary number of events
    - Event count can be increased after initial run
    - Tasks are parallelized by automated processing pipeline
  - Generate summary plots for entire run

# Web based MC framework for EXO

- Web interface shows collaborators what MC data is available, and exactly how it was created
- Provides access to data via data catalog
- For EXO creating new tasks is restricted to web czar
  - Prioritizes/evaluates requests
  - Combines similar requests where appropriate
  - Monitors and ensures runs are successful and that final plots look good

# MC Web Interface screenshots

## EXO Simulation Summary

Name contains  Parent **All**

200 items found, displaying all items.

1

Name	Parent	Requested Events	Generated Events	Created By	Created On	Actions	Pipeline	Links
trash21	Phase3Gen_PARENT	5000000		bung	2013-05-23 07:57	Clone Inherit Test Launch		
Task 399	PointSource_Th232_nx507	5000000		bung	2013-09-11 17:39	Clone Inherit Test Launch		
Task 396	PointSource_Th232_nx507	5000000		bung	2013-09-11 17:37	Clone Inherit Test Launch		
Task 349	Phase3_PARENT	1000000		bung	2013-06-17 10:52	Clone Inherit Test Launch		
Task 297	Phase2b_PARENT	1000000		bung	2013-03-01 12:10	Clone Inherit Test Launch		
Task 285	Phase3_PARENT	50000000		bung	2013-02-15 14:19	Clone Inherit Test Launch		
Task 262	Phase3_PARENT	4000000		bung	2013-02-12 17:20	Clone Inherit Test Launch		
Task 257	Phase3_PARENT	4000000		bung	2013-02-11 18:26	Clone Inherit Test Launch		
Task 197	P3_APDFrame_Th232	1000000		bung	2013-01-26 00:20	Clone Inherit Test Launch		
Task 186	Phase3_PARENT	1000000		bung	2013-01-25 21:54	Clone Inherit Test Launch		
PointSource_Th232_nx859	PointSource_Th232_nx577	1000000	999800	bung	2013-09-11 17:40	Clone Inherit Test Launch	Failed	Output Files
PointSource_Th232_nx789	PointSource_Th232_nx577	1000000	1000000	bung	2013-09-11 17:39	Clone Inherit Test Launch	Failed	Output Files
PointSource_Th232_nx718	PointSource_Th232_nx577	5000000	4952000	bung	2013-09-11 17:38	Clone Inherit Test Launch	Failed	Output Files
PointSource_Th232_nx648	PointSource_Th232_nx577	5000000	4965000	bung	2013-09-11 17:37	Clone Inherit Test Launch	Failed	Output Files
PointSource_Th232_nx577	PointSource_Th232_nx507	5000000	4991000	bung	2013-09-11 17:31	Clone Inherit Test Launch	Failed	Output Files
PointSource_Th232_nx507	Phase3_PARENT	5000000	4874000	bung	2013-09-11 17:30	Clone Inherit Test Launch	Failed	Output Files
PointSource_Th232_nx436	Phase3_PARENT	5000000	4934000	bung	2013-09-11 17:28	Clone Inherit Test Launch	Failed	Output Files
PointSource_Th232_nx366	Phase3_PARENT	5000000	4946000	bung	2013-09-11 17:27	Clone Inherit Test Launch	Terminated	Output Files
PointSource_Th232_nx295	Phase3_PARENT	5000000	4977000	bung	2013-09-11 17:26	Clone Inherit Test Launch	Failed	Output Files
PointSource_Th232_nx225	Phase3_PARENT	5000000	4986000	bung	2013-09-11 17:20	Clone Inherit Test Launch	Failed	Output Files
Phase3nCap_PARENT		10000000		bung	2013-07-31 20:01	Clone Inherit Test Launch		
Phase3IS_PARENT		1000000		bung	2013-03-11 08:31	Clone Inherit Test Launch		
Phase3Gen_PARENT		5000000		bung	2013-03-18 09:31	Clone Inherit Test Launch		
Phase3_PARENT		1000000		bung	2012-10-22 08:16	Clone Inherit Test Launch		
P3Ray_SourceS5_Co60_new	Phase3_PARENT	4000000	3992000	bung	2013-03-23 02:31	Clone Inherit Test Launch	Terminated	
P3R_SourceS5_Th228_px200_nz600	Phase3_PARENT	2000000	100	bung	2013-03-22 07:58	Clone Inherit Test Launch	Success	
P3R_SourceS5_Th228_px100_nz600	P3R_SourceS5_Th228_px200_nz600	2000000		bung	2013-03-22 08:04	Clone Inherit Test Launch		
P3R_SourceS5_Th228_nz600	P3R_SourceS5_Th228_px200_nz600	2000000	100	bung	2013-03-22 08:09	Clone Inherit Test Launch	Success	
P3nCap_Vessel_Cu65	Phase3nCap_PARENT	10000000	9610000	bung	2013-07-31 20:22	Clone Inherit Test Launch	Terminated	Output Files
P3nCap_Vessel_Cu63	Phase3nCap_PARENT	10000000	9810000	bung	2013-07-31 20:20	Clone Inherit Test Launch	Terminated	Output Files
P3nCap_OuterCryo_Cu65	Phase3nCap_PARENT	10000000	9030000	bung	2013-07-31 20:26	Clone Inherit Test Launch	Terminated	Output Files

# MC Web Interface screenshots

## Task P3\_Source\_S8\_px257\_py10

### Properties

[Edit](#)

<b>Name</b>	P3_Source_S8_px257_py10
<b>Description</b>	Task cloned from P3_Source_S8_px257

### Parameters

[Edit](#)

Name	Value	From task	Notation
DATA_CAT_DIR	/EXO/MC/Phase3c	Phase3_PARENT	
EXO_FILE	mc.exo	Phase3_PARENT	The .exo file used to run the mc job
EXOBASE	/nfs/slac/g/exo/software/hudson/builds-rhe5/svn-id/8274	Phase3_PARENT	The version of EXOAnalysis to use for simulation
MAC_FORBIDDEN	false	P3_Source_S8_px257_py10	
MAC_ISOTOPE	Th228	P3_Source_S8_px257_py10	
MAX_EVENTS_PER_JOB	40000	P3_Source_S8_px257_py10	The number of jobs in each parallel job
OUTPUT_DIR	/nfs/slac/g/exo_data2/exo_data/data/MC/Phase3a_svn7148/\${MC_TASK}	P3_Source_S8_px257_py10	
PIPELINE_TASK	EXOGenericMonteCarlo	Phase3_PARENT	The pipeline task to use
PrintModulo	500	P3_Source_S8_px257_py10	Diagnostic message rate
RECON_DRIFT_VELOCITY	.00171	Phase3_PARENT	/rec/drift_velocity_mm_per_ns
RUN_SIMULATION	BriansSimulation.py	Phase3_PARENT	The script to run on the main job
SIM_DRIFT_VELOCITY	0.171	Phase3_PARENT	/digitizer/driftVelocity
TOTAL_EVENTS_REQUESTED	4000000	P3_Source_S8_px257_py10	The total number of events requested

### Templates

[Add template](#)

Name	From task	Actions	Contents
mc.exo.template	P3_Source_S8_px257_py10	<a href="#">Edit</a> <a href="#">Rename</a> <a href="#">Delete</a>	<pre>load \$EXOLIB/plugins/EXOGeant4Module.* use exosim digitizer rec rsetime uind wiregaindummy v-wiregaindummy cluster gridcorr toutput /exosim/macro mc.mac /exosim/SkipEmptyEvents true /exosim/initial seed %(INITIALSEED)s /exosim/run_number %(PIPELINE_STREAM)s /exosim/SourcePosition 8 2.57 0.1 29.48 /digitizer/setDatabaseTime 1348000000 /digitizer/driftVelocity %(SIM_DRIFT_VELOCITY)s /digitizer/collectionDriftVelocity .225 /digitizer/setDigitizationTime 2048 microsecond /digitizer/setTriggerTime 1024 microsecond /digitizer/LXeEnergyRes 0.0 /digitizer/wireNoise 800. /digitizer/APDNoise 2000. /digitizer/ElectronicsDBFlavor measured_times /ccluster/drift_velocity_mm_per_ns %(RECON_DRIFT_VELOCITY)s /rec/LowerFitBoundWire 40 /rec/UpperFitBoundWire 140</pre>

# Potential simulation portal for DESC

- Evaluating the use of these tools for DESC simulation portal
  - Would allow users to request ImSim runs
  - Would use processing pipeline coupled with Panda to run at:
    - SLAC/Grid/NERSC/IN2P3/...
  - Would provide single place to find and access existing datasets
  - Perhaps provide skimmer for selecting interesting observations

# Open Questions

- Would this be useful?
  - If so exactly what exact functionality would need to be accessible from the web interface
    - Are there simulation experts/physics group contacts who would be willing to work with us on this?
  - Would we need a MC czar to coordinate requests
    - Or could it be totally self-service
  -